

REMARKS

Reconsideration and allowance of the claims are requested in view of the above amendments and the following remarks. Claims 1, 2, 24, 27, 28, 50, 53, 54, 60 and 61 have been amended. Support for the claim amendments may be found in the specification and claims as originally filed. For example, support for the claim amendments may be found in the specification at least at page 4, 2nd paragraph and Figure 1. No new matter has been added. Claims 18, 44, 59 and 66 were previously cancelled without prejudice or disclaimer.

Upon entry of this amendment, claims 1-17, 19-43, 45-58 and 60-65 will be pending in the present application, with claims 1, 27, 53 and 60 being independent.

Applicants thank Examiners Dangelino Gortayo and Debbie Le for the courtesies extended to applicants' representative, Mr. Sung Kim, during a personal interview conducted on March 19, 2008. The substance of the interview is incorporated in the following remarks.

1. Rejections Under 35 U.S.C. §101

The Office Action rejects claims 53-58 and 60-65 under 35 U.S.C. §101 as being directed to non-statutory subject matter. Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action on pages 2-3 asserts that the claims are directed to an apparatus but recite no physical hardware to be used to process and execute the claimed limitations. Although applicants do not necessarily agree with this assertion, for purposes of economy of prosecution independent claims 53 and 60 have been amended to include the elements of at least one memory and at least on processing unit (i.e., physical hardware) as discussed during the interview. Applicants submit that claims 53 and 60, and the claims dependent thereon, are directed to statutory subject matter.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 53-58 and 60-65 under 35 U.S.C. §101 are respectfully requested.

2. Rejections Under 35 U.S.C. §103

A. Obviousness in view of Aggarwal et al. and Rao et al.

The Office Action rejects claims 1-4, 17, 19-20, 23-25, 27-30, 43, 45-46, 49-51, 53-55, 58, 60-62 and 65 under 35 U.S.C. §103(a) as being unpatentable over Aggarwal et al. (U.S. Patent 6,922,700) in view of Rao et al. ("Automating Physical Database Design in a Parallel Database"). Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action on page 4 asserts that Aggarwal et al. discloses compiling a pool of horizontally partitioned candidate structures (citing col. 3, lines 52-63; col. 4, lines 24-43; col. 5, lines 7-22; col. 6, lines 36-43). The Office Action on page 5 also asserts that Aggarwal et al. discloses wherein determining generalized partitioned structures is performed by merging partitioned structures in the pool of partitioned candidate structures (citing col. 7, lines 30-64). As discussed during the interview, applicants respectfully disagree with these assertions.

Aggarwal et al. discloses similarity indexing and searching in multi-dimensional databases. Given a set of data points in a multidimensional space, the values of the data points on each dimension are partitioned into a plurality of grids, wherein each grid is assigned a grid value. Given a target data point, similarity candidates (i.e., data points that are similar to the target data point) are identified based on matching grid values. An inverted grid index comprising an index of the data points falling into each grid of each dimension is utilized to identify similarity candidates (see abstract).

Aggarwal et al. discloses building an inverted grid index 170, a correlation table 180, and a correlation support count table 190 and maintaining a score table 195 (see col. 3, lines 52-56; Figure 1). Aggarwal et al. also discloses a data structure for an inverted grid index including three attribute fields (see col. 4, lines 24-33; Figure 3), and an exemplary correlation support count table and an exemplary correlation table (see Figures 5 and 6). Aggarwal et al. discloses that the grid index, correlation table, correlation support count table and score table are built as separate entities of a server logic 140 (e.g., see Figure 1). However, as discussed during the interview, Aggarwal et al. fails to teach or suggest that the grid index, correlation table,

correlation support count table and score table are combined or compiled into a pool. Therefore, Aggarwal et al. fails to teach or suggest at least the elements of compiling a pool of horizontally partitioned candidate structures, as included in independent claims 1 and 27. Independent claims 53 and 60 include similar elements.

Aggarwal et al. also discloses a method for building an inverted grid index (see col. 7, lines 30-64). However, the discussion in Aggarwal et al. for building an inverted grid index focuses on steps for building a single entity of the server logic 140. As discussed during the interview, Aggarwal et al. is silent as to merging separate entities of the server logic, such as merging the inverted grid index with at least one of the correlation table, the correlation support count table, the score table or even another inverted grid index. Therefore, Aggarwal et al. fails to disclose or suggest at least the elements of merging partitioned structures in a pool of partitioned candidate structures, as included in independent claims 1 and 27. Independent claims 53 and 60 include similar elements.

Additionally, the Office Action on page 5 concedes that Aggarwal et al. does not teach determining partitioned structures is performed by merging the horizontal partitioning methods associated with the partitioned structures in the pool. However, the Office Action asserts that Rao et al. discloses this feature (citing Section 3, page 2, 2nd paragraph to page 3, 1st paragraph; Section 5.2; Section 6, page 6, paragraphs 6-10; Section 7.2; and Section 7.3). Applicants respectfully disagree with the assertions regarding Rao et al.

Rao et al. discloses automating the process of data partitioning. Given a workload of SQL statements, Rao et al. seeks to determine automatically how to partition the base data across multiple nodes to achieve overall optimal performance for that workload. A query optimizer is used to both recommend candidate partitions for each table that will benefit each query in the workload, and to evaluate various combinations of these candidates (see abstract, page 1; Section 3, page 2, 2nd paragraph to page 3, 1st paragraph).

Rao et al. also discloses an EVALUATE mode in which the optimizer reads in marked partitions from a CANDIDATE_PARTITION table and uses it to replace original partitions of the corresponding table before optimization starts (see Section 5.2). Additionally, Rao et al.

discloses a cost model used in DB2 and an approach to ensuring consistent cost estimation when changing partitions (see Section 6). Specifically, Rao et al. discloses how to adjust per-node statistics with new table partitions in both RECOMMEND and EVALUATE mode. Furthermore, Rao et al. discloses generating additional candidate partitions through partition expansion as well as enumerating algorithms and rank-based enumeration (see Sections 7.2 and 7.3). Furthermore, Rao et al. discloses that an enumeration algorithm will combine candidate partitions from different tables in certain ways and evaluate the workload in EVALUATE mode for each combination (see page 3, 2nd paragraph).

However, as discussed during the interview, Rao et al. fails to disclose or suggest, at the sections cited by the Office Action or elsewhere, merging not only partitioned structures in a pool of partitioned candidate structures but also merging horizontal partitioning methods associated with the partitioned structures in the pool. As discussed in the present specification:

The inclusion of horizontal partitioning introduces challenges during merging. First, it is not sufficient to simply merge the objects (e.g., indexes) themselves, but the associated partitioning methods must also be merged. This is non-trivial because the method of merging may depend on the partitioning method and vice versa. (see page 24, line 22 – page 25, line 2; emphasis added).

When merging two structures, the fact that structures being merged may be co-located must be considered. Thus if the partitioning method is not retained in the merged structure, the benefit of partitioning the merged structure may be significantly diminished (to the extent that the merged structure is no longer useful). (see page 25, lines 8-11; emphasis added).

Additionally, a method for merging two horizontally partitioned indexes, including their respective partitioning methods, is discussed in the present specification at least at pages 26-29.

Therefore, Rao et al. fails to disclose or suggest at least the elements of wherein determining generalized partitioned structures is performed by merging partitioned structures in the pool of partitioned candidate structures and merging the horizontal partitioning methods

associated with the partitioned structures in the pool, as included in independent claim 1. Independent claims 27, 53 and 60 include similar elements.

Therefore, since Aggarwal et al. and Rao et al., alone or in combination, fail to teach or suggest every element of claims 1, 27, 53 and 60, these claims are allowable.

Claims 2-4, 17, 19-20 and 23-25 depend from claim 1. Claims 28-30, 43, 45-46 and 49-51 depend from claim 27. Claims 54-55 and 58 depend from claim 53. Claims 61-62 and 65 depend from claim 60. As discussed above, claims 1, 27, 53 and 60 are allowable. For at least this reason, and the features recited therein, claims 2-4, 17, 19-20, 23-25, 28-30, 43, 45-46, 49-51, 54-55, 58, 61-62 and 65 are also allowable.

Furthermore, in regards to claim 4, the Office Action on page 7 asserts that Aggarwal et al. teaches “the set of column-subsets is generated by evaluating a total cost of all queries in the workload that reference a given column-set and selecting column-sets that have a relatively high total cost of queries” (citing col. 11, line 57 – col. 12, line 10). Applicants respectfully disagree.

Aggarwal et al. discloses a method for computing a closeness measure of a target point to a similarity candidate (see Figure 11). Based on the method of Figure 11, data points of similarity candidates are added to a score table and their similarity scores are computed via a similarity function and entered into the table (see col. 11, lines 61-64). However, as discussed during the interview, Aggarwal et al., at the sections cited by the Office Action or elsewhere, fail to disclose or suggest at least the elements of examining a workload to form a set of constraints on structures that may be added to a pool of partitioned candidate structures, wherein the set of constraints is a set of column-subsets on which structures can be partitioned, wherein the set of column-subsets is generated by evaluating a total cost of all queries in the workload that reference a given column-set and selecting column-sets that have a relatively high total cost of queries, as included in claim 4.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 1-4, 17, 19-20, 23-25, 27-30, 43, 45-46, 49-51, 53-55, 58, 60-62 and 65 under 35 U.S.C. §103(a) are respectfully requested.

B. Obviousness in view of Aggarwal et al., Rao et al. and Wang

The Office Action rejects claims 5-6, 21-22, 31-32, 47-48, 56 and 63 under 35 U.S.C. § 103(a) as being unpatentable over Aggarwal et al. and Rao et al. and further in view of Wang (U.S. Patent 5,758,345). Applicants respectfully traverse this rejection for at least the following reasons.

As discussed above, Aggarwal et al. and Rao et al. fail to disclose or suggest all of the elements included in independent claims 1, 27, 53 and 60. Wang fails to cure this defect.

Wang discloses a method for use with a massively parallel processor system or a distributed computer system for providing a physical design layout database across several nodes of the system (see abstract). However, Wang fails to disclose or suggest the elements of wherein determining generalized partitioned structures is performed by merging partitioned structures in the pool of partitioned candidate structures and merging the horizontal partitioning methods associated with the partitioned structures in the pool, as included in independent claim 1. As discussed above, independent claims 27, 53 and 60 include similar elements.

Therefore, since Aggarwal et al., Rao et al. and Wang, alone or in combination, fail to teach or suggest every element of claims 1, 27, 53 and 60, these claims are allowable.

Claims 5-6 and 21-22 depend from claim 1. Claims 31-32 and 47-48 depend from claim 27. Claim 56 depends from claim 53. Claim 63 depends from claim 60. As discussed above, claims 1, 27, 53 and 60 are allowable. For at least this reason, and the features recited therein, claims 5-6, 21-22, 31-32, 47-48, 56 and 63 are also allowable.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 5-6, 21-22, 31-32, 47-48, 56 and 63 under 35 U.S.C. §103(a) are respectfully requested.

C. Obviousness in View of Aggarwal et al., Rao et al. and Pederson et al.

The Office Action rejects claims 7-16, 26, 33-42, 52, 57 and 64 under 35 U.S.C. § 103(a) as being unpatentable over Aggarwal et al. and Rao et al. and further in view of Pederson et al. (U.S. Patent 5,864,842). Applicants respectfully traverse this rejection for at least the following reasons.

As discussed above, Aggarwal et al. and Rao et al. fail to disclose or suggest all of the elements included in independent claims 1, 27, 53 and 60. Pederson et al. fails to cure this defect.

Pederson et al. discloses a method for optimizing SQL queries in a relational database management system using hash star join operations (see col. 1, lines 57-60). However, Pederson et al. fails to disclose or suggest at least the elements of wherein determining generalized partitioned structures is performed by merging partitioned structures in the pool of partitioned candidate structures and merging the horizontal partitioning methods associated with the partitioned structures in the pool, as included in independent claim 1. As discussed above, independent claims 27, 53 and 60 include similar elements.

Therefore, since Aggarwal et al., Rao et al. and Pederson et al., alone or in combination, fail to teach or suggest every element of claims 1, 27, 53 and 60, these claims are allowable.

Claims 7-16 and 26 depend from claim 1. Claims 33-42 and 52 depend from claim 27. Claim 57 depends from claim 53. Claim 64 depends from claim 60. As discussed above, claims 1, 27, 53 and 60 are allowable. For at least this reason, and the features recited therein, claims 7-16, 26, 33-42, 52, 57 and 64 are also allowable.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 7-16, 26, 33-42, 52, 57 and 64 under 35 U.S.C. §103(a) are respectfully requested.

3. Conclusion

Accordingly, in view of the above amendment and remarks it is submitted that the claims are patentably distinct over the prior art and that all the rejections to the claims have been overcome. Reconsideration and reexamination of the present application is requested. Based on the foregoing, applicants respectfully request that the pending claims be allowed, and that a timely Notice of Allowance be issued in this case. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the applicants' attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee that is not covered by an enclosed check please charge any deficiency to Deposit Account No. 50-0463.

Respectfully submitted,
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